

WHAT IS CLAIMED IS:

1. A method for manufacturing a structural element comprising:
providing a first part with a surface substantially of copper;
depositing a hard layer on said surface of said first part, said hard layer consisting of at least one of the following materials:
 - a) SiO_x with $1.5 \leq x \leq 2$;
 - b) TaSiN;
 - c) TiN;
 - d) AlO;
 - e) TiSiN;
 - f) TaN;
 - g) SiN;
 - h) WSiN;
 - i) ReO;
 - j) PdO;
 - k) ZrO;
 - l) YO;
 - m) ZrN;
 - n) NbN;
 - o) VN;
 - p) CuN;

whereby said hard layer is amorphous under X-rays.

2. The method of claim 1 further comprising the steps of providing a second part with a surface of a metal, and connecting said first part with said second part by bonding said surface of said first part to said surface of said second part.
3. The method of claim 1 further comprising the step of depositing said hard layer so that said hard layer is stable to at least 80° C.

4. The method of claim 1 further comprising the step of depositing said hard layer so that said hard layer is stable to at least 100° C.
5. The method of claim 1 further comprising the step of depositing said hard layer so that said hard layer is stable to at least 150° C.
6. The method of claim 1 further comprising the step of depositing said hard layer so that said hard layer is stable to at least 200° C.
7. The method of claim 1 further comprising the step of depositing said hard layer so that said hard layer is stable to at least 300° C.
8. The method of claim 2 wherein said surface of said second part substantially consists of copper.
9. The method of claim 2 wherein the surface of said second part consists of gold and of aluminum.
10. The method of claim 1 wherein at least one of said first part or said second part is a wire.
11. The method of claim 1 further comprising the step of depositing said hard layer by a vacuum deposition process.
12. The method of claim 1 further comprising the step of cleaning said surface of said first part before depositing said hard layer.
13. The method of claim 12 wherein said cleaning is by a treatment in a hydrogen plasma or in a nitrogen/hydrogen plasma.

14. The method of claim 1 further comprising depositing said hard layer with a thickness of at least 1.5 nm.
15. The method of claim 14 further comprising depositing said hard layer with a thickness of at least 2 nm.
16. The method of claim 1 further comprising the step of depositing said layer with a thickness d which is in the range of $2.0 \text{ nm} \leq d \leq 10 \text{ nm}$.
17. The method of claim 1, wherein said material of said hard layer comprises oxygen in a substoichiometric ratio.
18. The method of claim 1, wherein said step of depositing said hard layer comprises depositing a layer and treating said layer deposited in at least one of a nitrogen plasma and in ambient atmosphere.
19. The method of claim 1, wherein said material comprises SiO_2 .
20. The method of claim 1, wherein said hard layer consists of SiO_x and is deposited by sputtering.
21. The method of claim 20 further comprising the step of depositing said Si by sputtering.
22. The method of claim 1 wherein depositing said hard layer comprises depositing a layer of Si and treating said layer of Si by a thermal treatment in ambient atmosphere.
23. The method of claim 1, wherein said depositing comprises depositing a metallic layer and oxidizing said metallic layer.

24. The method of claim 23 further comprising the step of oxidizing by at least one of the following parameters:

thickness of the layer;

temperature during oxidizing; and

the atmosphere wherein said oxidizing is performed.

25. The method of claim 1, wherein said material comprises $Ta_xSi_yN_z$ and wherein x is in the range $35 \leq x \leq 55$; y is in the range $12 \leq y \leq 18$; and z is in the range $32 \leq z \leq 48$ with $x + y + z = 100$.

26. The method of claim 1, wherein said material comprises $Ta_{45}Si_{15}N_{40}$.

27. The method of claim 1, wherein said material comprises Si_3N_4 .

28. The method of claim 1 further comprising depositing said hard layer as an electrically insulating layer.

29. The method of claim 1 further comprising the step of depositing said hard layer as an electrically conductive layer.

30. The method of claim 1 further comprising the step of selecting said hard layer to be of one of said materials.

31. The method of claim 1 wherein said layer is a functional layer of a function of said element.